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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/060,247	02/01/2002	Hiromi Yuasa	219138US2SRD	8893

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EXAMINER	
BERNATZ, KEVIN M	

ART UNIT	PAPER NUMBER
1773	

DATE MAILED: 11/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/060,247	YUASA ET AL.
	Examiner	Art Unit
	Kevin M Bernatz	1773

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 32-49 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 32-49 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Cancellation of claims 25 – 31 and addition of claims 32 - 49, filed on August 6, 2004, have been entered in the above-identified application.

2. Applicants' request for reconsideration and associated declaration, filed October 14, 2004 crossed in the mail with the Office Action mailed October 19, 2004. The following action is a substantial duplicate of the Office Action mailed October 19, 2004 with due consideration given to Applicants' papers filed October 14, 2004.

3. Applicants' Declaration of Hiromi Yuasa has been received and given due consideration.

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 37 and 46 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 37 and 46 recites the limitation "the antiferromagnetic layer" in line 5. There is insufficient antecedent basis for this limitation in the claim. For purposes of

evaluating the prior art, the Examiner has interpreted claim 37 as if it depended from claim 36 and claim 46 as if it depended from claim 45 (similarly to prior claims 28 and 29).

Claim Rejections - 35 USC § 103

7. Claims 32 - 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiguchi et al. (U.S. Patent App. No. 2002/0048128 A1) in view of Yoshikawa et al. (JP 11-154609 A). See U.S. Patent No. 6,132,892 which is the U.S. equivalent of JP '609 A.

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the

reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Regarding claim 32 – 35 and 41 - 44, Kamiguchi et al. disclose a magnetic recording-reproducing apparatus comprising a magnetic recording medium and a magnetic head using a magnetoresistive device (*Title and Figures*) comprising a magnetization pinned layer of which the magnetization direction is substantially pinned to one direction (*Figure 9, element P and Paragraph 0094*); a magnetization free layer of which the magnetization direction is changed in accordance to an external magnetic field (*Element F and Paragraph 0094*); a nonmagnetic intermediate layer formed between the magnetization pinned layer and the magnetization free layer (*Element S and Paragraph 0092*); and electrodes (*Elements El*) allowing a sense current to flow in a direction substantially perpendicular to the plane of the stack including the magnetization pinned layer, the nonmagnetic intermediate layer and the magnetization free layer (*Paragraphs 0096 – 0098*), wherein at least one of the magnetization pinned layer and the magnetization free layer have a laminate structure comprising at least two ferromagnetic layers and at least one insert layer formed between the two ferromagnetic layers (*Elements FM, R, NM*), the ferromagnetic layers being formed of an FeCo alloy (*Paragraphs 0124 – 0126*) and the insert layers being formed of a non-magnetic material meeting applicants' claimed Markush group (*Paragraphs 0040, 0041 and 0132*) and having a thickness falling in the range of between 0.03 nm and 1 nm (*Paragraph 0046 and Examples*).

Kamiguchi et al. fail to explicitly disclose using a FeCo or FeCoM Fe-rich alloy meeting applicants' claimed crystal structure and composition limitations.

However, Yoshikawa et al. teach that body centered cubic (bcc) Fe-rich FeCo (*col. 5, lines 59 – 65; col. 6, lines 20 – 30; and Table 5*) and FeCoM (*col. 7, lines 11 – 29*) soft-magnetic alloys possessing a composition meeting applicants' claimed composition limitations ((*col. 5, lines 59 – 65; col. 6, lines 20 – 30; col. 7, lines 11 – 29; and Table 5*) for use in thin-film magnetic heads (*col. 1, lines 8 – 45*) wherein the use of a Fe-rich composition is desired because "the first phase A can be constituted of a Fe-Co alloy of body-centered cubic structure in which large saturation magnetic flux density can be obtained" (*col. 6, lines 26 – 30*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Kamiguchi et al. to use an Fe-rich FeCo or FeCoM alloy meeting applicants' claimed composition limitations as taught by Yoshikawa et al. inorder to produce a Fe-Co alloy of body-centered cubic structure in which large saturation magnetic flux density can be obtained.

Regarding claims 36, 37, 45 and 46, Kamiguchi et al. disclose antiferromagnetic and electrode layers meeting applicants' claimed structural limitations (*Figure 8, layers "El" and "A"*).

Regarding claims 38 and 47, Kamiguchi et al. disclose insert layers meeting applicants' claimed composition limitations (*Paragraphs 0040, 0132 and Examples*).

Regarding claims 39 and 48, Kamiguchi et al. disclose pinned layers meeting applicants' claimed thickness limitations (*Paragraphs 0152 – 0153 and Examples*).

Regarding claims 40 and 49, the Examiner deems that it would have been obvious to form both the free and pinned magnetic layers with the same alloy since the benefit of a large saturation magnetic flux density is equally applicable to each layer and it would provide ease of manufacturing.

8. Claims 32 - 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiguchi et al. (U.S. Patent App. No. 2002/0051380 A1) in view of Yoshikawa et al. (JP 11-154609 A). See U.S. Patent No. 6,132,892 which is the U.S. equivalent of JP '609 A.

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the

reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Regarding claim 32 – 35 and 41 - 44, Kamiguchi et al. disclose a magnetic recording-reproducing apparatus comprising a magnetic recording medium and a magnetic head using a magnetoresistive device (*Title and Figures*) comprising a magnetization pinned layer of which the magnetization direction is substantially pinned to one direction (*Figure 1, element P and Paragraph 0034*); a magnetization free layer of which the magnetization direction is changed in accordance to an external magnetic field (*Element F and Paragraph 0034*); a nonmagnetic intermediate layer formed between the magnetization pinned layer and the magnetization free layer (*Element S and Paragraph 0034*); and electrodes (*Elements El*) allowing a sense current to flow in a direction substantially perpendicular to the plane of the stack including the magnetization pinned layer, the nonmagnetic intermediate layer and the magnetization free layer (*Element I and Paragraphs 0035 and 0085*), wherein at least one of the magnetization pinned layer and the magnetization free layer have a laminate structure comprising at least two ferromagnetic layers and at least one insert layer formed between the two ferromagnetic layers (*Elements PF, PN, FF and FN*), the ferromagnetic layers being formed of an FeCo alloy (*Paragraphs 0038, 0107 and 0108*) and the insert layers being formed of a non-magnetic material meeting applicants' claimed Markush group (*Paragraph 0090*) and having a thickness falling in the range of between 0.03 nm and 1 nm (*Paragraph 0094 and Examples*).

Kamiguchi et al. fail to explicitly disclose using a FeCo or FeCoM Fe-rich alloy meeting applicants' claimed crystal structure and composition limitations.

However, Yoshikawa et al. teach that body centered cubic (bcc) Fe-rich FeCo (*col. 5, lines 59 – 65; col. 6, lines 20 – 30; and Table 5*) and FeCoM (*col. 7, lines 11 – 29*) soft-magnetic alloys possessing a composition meeting applicants' claimed composition limitations ((*col. 5, lines 59 – 65; col. 6, lines 20 – 30; col. 7, lines 11 – 29; and Table 5*) for use in thin-film magnetic heads (*col. 1, lines 8 – 45*) wherein the use of a Fe-rich composition is desired because "the first phase A can be constituted of a Fe-Co alloy of body-centered cubic structure in which large saturation magnetic flux density can be obtained" (*col. 6, lines 26 – 30*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Kamiguchi et al. to use an Fe-rich FeCo or FeCoM alloy meeting applicants' claimed composition limitations as taught by Yoshikawa et al. inorder to produce a Fe-Co alloy of body-centered cubic structure in which large saturation magnetic flux density can be obtained.

Regarding claims 36, 37, 45 and 46, Kamiguchi et al. disclose antiferromagnetic and electrode layers meeting applicants' claimed structural limitations (*Figure 1, layers "El" and "A"*).

Regarding claims 38 and 47, Kamiguchi et al. disclose insert layers meeting applicants' claimed composition limitations (*Paragraph 0090 and Examples*).

Regarding claims 39 and 48, Kamiguchi et al. disclose pinned layers meeting applicants' claimed thickness limitations (*Paragraph 0093 and Examples*).

Regarding claims 40 and 49, the Examiner deems that it would have been obvious to form both the free and pinned magnetic layers with the same alloy since the benefit of a large saturation magnetic flux density is equally applicable to each layer and it would provide ease of manufacturing.

9. Claims 32 - 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dykes et al. (U.S. Patent No. 5,668,688) in view of Iwasaki et al. (U.S. Patent No. 6,159,593) and Yoshikawa et al. (JP 11-154609 A). See U.S. Patent No. 6,132,892 which is the U.S. equivalent of JP '609 A.

Regarding claim 32 – 35 and 41 - 44, Dykes et al. disclose a magnetic recording-reproducing apparatus comprising a magnetic recording medium and a magnetic head using a magnetoresistive device (*Title and Figures*) comprising a magnetization pinned layer of which the magnetization direction is substantially pinned to one direction (*Figure 3A, element 98 and col. 3, lines 60 - 62*); a magnetization free layer of which the magnetization direction is changed in accordance to an external magnetic field (*Element 94 and col. 1, lines 41 - 53*); a nonmagnetic intermediate layer formed between the magnetization pinned layer and the magnetization free layer (*Element 96 and col. 3, lines 46 - 55*); and electrodes (*Elements 92 and 104*) allowing a sense current to flow in a direction substantially perpendicular to the plane of the stack including the magnetization pinned layer, the nonmagnetic intermediate layer and the magnetization free layer (*Figure 3B and col. 1, lines 20 - 28*).

Dykes et al. fail to disclose wherein at least one of the magnetization pinned layer and the magnetization free layer have a laminate structure comprising at least two ferromagnetic layers and at least one insert layer formed between the two ferromagnetic layers, in which the ferromagnetic layers are ferromagnetically coupled, the ferromagnetic layers being formed of an FeCo alloy and the insert layers being formed of a non-magnetic material meeting applicants' claimed Markush group and having a thickness falling in the range of between 0.03 nm and 1 nm.

However, Iwasaki et al. teach that in magnetoresistive elements, using a free and/or pinned magnetic layer possessing a laminate structure meeting applicants claimed structural limitations (*Figure 37, elements 51 and 52, and col. 42, line 54 bridging col. 43, line 17*), the ferromagnetic layers being formed of an FeCo alloy (*col. 43, lines 58 – 67 and Table 4*) and the insert layers being formed of a non-magnetic material meeting applicants' claimed Markush group (*col. 43, lines 58 – 67 and Examples*) results in a spin valve structure which "has a good soft magnetism and shows a large resistance change with a slight magnetic field" (*col. 43, lines 28 – 57*). While Iwasaki et al. is directed to a CiP (Current-in-Plane) style MR device, the Examiner notes that the benefit of a large resistance change with a slight magnetic field is applicable regardless of the type of MR sensor employed.

It would, therefore, have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Dykes et al. to use a laminate pinned and free layer structure meeting applicants claimed structural and non-magnetic material limitations as taught by Iwasaki et al. since such a structure results in a spin

valve structure which "has a good soft magnetism and shows a large resistance change with a slight magnetic field".

None of the above explicitly disclose using a FeCo or FeCoM Fe-rich alloy meeting applicants' claimed crystal structure and composition limitations.

However, Yoshikawa et al. teach that body centered cubic (bcc) Fe-rich FeCo (*col. 5, lines 59 – 65; col. 6, lines 20 – 30; and Table 5*) and FeCoM (*col. 7, lines 11 – 29*) soft-magnetic alloys possessing a composition meeting applicants' claimed composition limitations ((*col. 5, lines 59 – 65; col. 6, lines 20 – 30; col. 7, lines 11 – 29; and Table 5*) for use in thin-film magnetic heads (*col. 1, lines 8 – 45*) wherein the use of a Fe-rich composition is desired because "the first phase A can be constituted of a Fe-Co alloy of body-centered cubic structure in which large saturation magnetic flux density can be obtained" (*col. 6, lines 26 – 30*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Kamiguchi et al. to use an Fe-rich FeCo or FeCoM alloy meeting applicants' claimed composition limitations as taught by Yoshikawa et al. inorder to produce a Fe-Co alloy of body-centered cubic structure in which large saturation magnetic flux density can be obtained.

Regarding claims 36, 37, 45 and 46, Dykes et al. disclose antiferromagnetic and electrode layers meeting applicants' claimed structural limitations (*Figure 3A, layers 92, 100 and 104; and col. 3, lines 55 – 58*).

Regarding claims 38 and 47, Iwasaki et al. disclose insert layers meeting applicants' claimed composition limitations (*col. 43, lines 58 – 67 and Examples*).

Regarding claims 39 and 48, Kamiguchi et al. disclose pinned layers meeting applicants' claimed thickness limitations (*Figures; Table 4; and Examples*).

Regarding claims 40 and 49, the Examiner deems that it would have been obvious to form both the free and pinned magnetic layers with the same alloy since the benefit of a large saturation magnetic flux density is equally applicable to each layer and it would provide ease of manufacturing.

Response to Arguments

10. The prior rejection of claims 25 - 31 under 35 U.S.C § 103(a) – various references

Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection. In so far as they apply to the present rejection of record, applicants argue that the combination of a CiP structure with a CPP structure would not have been motivated by one of ordinary skill in the art. The Examiner respectfully disagrees.

Current-in-Plane (CIP) and Current-Perpendicular-to-the-Plane (CPP) magnetoresistive (MR) elements are the two known embodiments of MR elements used in magnetic heads, for example. One of ordinary skill in the art would be readily appraised of the benefits and detriments associated with each type of head structure, as well as the knowledge that the principal difference is in the relative location of the electrodes. The Examiner acknowledges there are other minor differences, but deems that one of ordinary skill in the art would readily appreciate that the function of the MR

element in either arrangement is substantially identical. Given that Yoshikawa et al. disclose FM alloy compositions that achieve improved performance in a CiP arrangement, it would be within the knowledge of one of ordinary skill in the art to use such a composition in an MR element arranged in a CPP manner.

Applicants further argue that the declaration of Hiromi Yuasa illustrates that the claimed alloy composition possesses unexpected improvement over the broad range of alloy compositions taught by Yoshikawa et al. when used in a CPP configuration versus a CiP configuration. The Examiner respectfully disagrees.

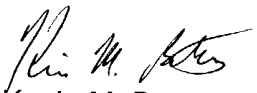
The Examiner notes that applicants' claims are not commensurate in scope with the showing in the aforementioned declaration. Specifically, in reference to claim 1, applicants' claims cover a range of Fe from 20 – 100 % while the declaration shows the improvement in ADR for a just 50% Fe (single layer example 2). With regard to laminate structures, the declaration shows the improvement for a range of 50 – 80% Fe. Applicants are reminded that amendment to change the range in composition of applicants alloy *must draw support from the as-filed disclosure*.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on (571) 272-1535. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Kevin M. Bernatz, PhD.
Primary Examiner

November 5, 2004